



UNIVERSITÀ  
DEGLI STUDI  
DI MILANO

Master's degree programme in

**Bioinformatics  
for computational  
genomics**

facoltà di

**SCIENZE E TECNOLOGIE**

The Master Degree is established jointly with the School of Industrial and Information Engineering of the Politecnico of Milan.

## Applications and admissions

With mandatory access test.

## Admission requirements

Applicants with an Italian degree (ex. DM 270/04 or equivalent ex. DM 509/99) from one of the following classes: Biotechnology (L-2), Biology (L-13), Agriculture and Food Sciences (L-26), Pharmacological Sciences (L-29), Information Engineering (L-8), Computer Science (L-31), Physics (L-30), Mathematics (L-35), Statistics (L-41) provided they have acquired 30 credits in specific scientific-disciplinary sectors as specified in the Manifesto degli Studi.

Students with foreign qualifications can enroll to the course after positive judgement of the Admission Board, provided they have acquired a certain number of credits in specific scientific-disciplinary sectors specified in the Manifesto degli Studi.

Students must be proficient in English, with a B2 level of competence. In exceptional cases, students without a valid language certificate may be accepted on condition that their level of English proficiency, assessed during the interview, is evidently good. The adequate personal preparation of the candidates, their ability to communicate in English and their motivation are decisive elements for the admission and they are going to be verified and tested during the admission interview.

Knowledge of Italian is not required for attendance. However, foreign students are encouraged to acquire a basic knowledge of the Italian language before the final graduation through the courses organized by the University of Milan, as described in the Manifesto degli Studi.

## Objectives

The Master degree in Bioinformatics for computational genomics aims to form graduates with adequate knowledge about: the molecular basis of biological systems; the structure and function of biological molecules and their role in cellular processes; the technologies and platforms for analysis of genomes; the tools for bioinformatic and genomic analysis; statistical and computational methodologies for the analysis of biomolecular data.

The Master degree therefore includes activities providing in depth knowledge on:

- the organization of information in the genome, and the molecular and cellular processes at the basis of gene expression and its regulation;
- the experimental methods used for studying genes and their function in different model species, both prokaryotic and eukaryotic;
- the technologies employed in modern genomic research;
- methods and protocols of bioinformatic analysis in functional genomic studies;
- algorithmic, mathematical and statistical approaches underlying bioinformatic and genomic analysis tools;
- data base technologies for the storage and organization of the data;
- modelling and analysis techniques employed in systems biology for the study of interactions in complex biological systems.

The program includes an internship in research laboratories either at the University of Milan or in other Italian or foreign research institutes. Its results will be described in a final written dissertation, to be discussed in front of a thesis committee.

## Career prospects

Graduates in Bioinformatics for computational genomics are able to:

- take part in the design and execution of large scale genomic analyses;
- identify and extract the biological meaning from the results obtained;
- design autonomously tools and protocols for the bioinformatic analysis of different types of experimental data;
- play a pivotal role in research groups focused on basic or applied genomic research;
- coordinate and supervise research projects and groups focused on bioinformatics and genomics.

# Degree syllabus

I year

COMPULSORY LEARNING ACTIVITIES	ECTS
<b>I semester</b>	
Bioinformatics and computational biology	6
Organic chemistry	6
<b>II semester</b>	
Biostatistics	6
Genomics and transcriptomics	12
Machine learning	6
Scientific programming	6
In the first semester, students with a degree in computer science, engineering, mathematics or physics will attend the courses of the "Knowledge Alignment Plan 1", while students with a degree in life sciences (biology or biotechnology or equivalent) will attend the courses of the "Knowledge Alignment Plan 2".	
<i>Knowledge Alignment Plan 1</i>	
- Biochemistry	6
- Genetics, cellular and Molecular biology	12
<i>Knowledge Alignment Plan 2</i>	
- Programming and Data bases	12
- Statistics	6

II year

COMPULSORY LEARNING ACTIVITIES	ECTS
Advanced genomics and epigenomics	12
Structural chemistry	6
Systems biology and network analysis	6

## Other activities

- 12 ects by selecting from the following courses:
  - Genomic Big Data Management and Computing
  - Interdisciplinary Project
  - Neurogenomics and Brain Disease Modelling
- 3 ects for language skills (English or Italian for foreign students) and other activities (attendance to seminars, job fairs, etc.)
- Writing and defense of the final dissertation (3 ects)
- Final internship (18 ects)

# INFO

 **Disciplinary classification:** Industrial biotechnologies (LM-8 R)

 **Duration:** 2 years (120 ects)

 **Attendance:** highly recommended

 **Locations:**

- Settore Didattico - via Celoria, 26 and via Golgi - Milan
- Politecnico of Milan - piazza L. Da Vinci, 32 - Milan

 **For information:**

[bcgenomics@unimi.it](mailto:bcgenomics@unimi.it)

 **Websites:**

[bcg.cdl.unimi.it](http://bcg.cdl.unimi.it)  
[www.unimi.it](http://www.unimi.it)



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